What is claimed is:

1. An optical spectrometer component comprising:

a fiber optic input;

collimating optics disposed between the fiber optic input and

a linear variable filter having

an etalon structure with

a tapered spacer region being tapered along a taper direction,

the linear variable filter being affixed to

a linear optical detector array disposed along the taper direction.

2. The optical spectrometer of claim 1 wherein the collimating optics comprise a magnifying lens and a collimating lens.

3. The optical spectrometer of claim 1 wherein the linear variable filter has

a first reflector comprising a first plurality of high-index layers and a first plurality of SiO_2 layers, the first plurality of high-index layers alternating with the first plurality of SiO_2 layers; and

a second reflector comprising a second plurality of high-index layers and a second plurality of SiO_2 layers, the second plurality of high-index layers alternating with the second plurality of SiO_2 layers wherein the tapered spacer region comprises SiO_2.

4. The optical spectrometer of claim 3 wherein at least some layers of the first plurality of high-index layers comprise Ta_2O_5.

5. The optical spectrometer of claim 3 wherein at least some layers of the first plurality of high-index layers comprise Nb_2O_5.

6. The optical spectrometer of claim 1 wherein the linear variable filter has a thermal stability of less than 50 parts per million per degree Centigrade of ambient temperature change.

7. The optical spectrometer of claim 1 wherein the linear variable filter has a thermal stability of less than 25 parts per million per degree Centigrade of ambient temperature change.

8. The optical spectrometer of claim 1 wherein the linear variable filter has a thermal stability of less than 10 parts per million per degree Centigrade of ambient temperature change.

9. The optical spectrometer of claim 1 wherein the linear variable filter is a bandpass filter.

10. The optical spectrometer of claim 1 wherein the linear variable filter is a band-edge filter.

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11. An optical spectrometer component comprising:

a fiber optic input;

a magnifying lens disposed to expand an optical signal from the fiber optic input to

a collimating lens, the collimating lens disposed to provide a light beam to

a linear variable bandpass filter having

an etalon structure with

a tapered spacer region being tapered along a taper direction, the linear variable filter having a thermal stability of less than or equal to 50 parts per million per degree Centigrade of ambient temperature change; and

a linear optical detector array disposed along the taper direction.

12. The optical spectrometer of claim 11 wherein the optical detector array has a length along the taper direction of less than or equal to 12 mm.

13. The optical spectrometer of claim 11 wherein the linear variable bandpass filter has a 50% bandwidth of less than or equal to about 0.6 nm at a center wavelength, the center wavelength being between about 1530-1600 nm.

14. An optical spectrometer component comprising:

a fiber optic input;

a magnifying lens disposed to expand an optical signal from the fiber optic input to

a collimating lens, the collimating lens disposed to provide a light beam to

a linear variable bandpass filter having

an etalon structure with

a tapered spacer region being tapered along a taper direction, the linear variable filter having a thermal stability of less than or equal to 50 parts per million per degree Centigrade of ambient temperature change and a 50% bandwidth of less than or equal to about 0.6 nm at a center wavelength, the center wavelength being between about 1530-1600 nm; and

a linear optical detector array disposed along the taper direction, the linear optical detector array having a length of less than or equal to 12 mm along the taper direction.

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15. The optical spectrometer component of claim 14 wherein the linear optical detector array has at least 256 pixels.

16. The optical spectrometer component of claim 14 wherein the linear optical detector array has at least about 512 pixels so as to provide a nominal resolution of the optical spectrometer component of about 3 Angstroms or less.

17. A method of measuring an optical signal with an optical spectrometer, the method comprising:

calibrating an optical spectrometer component having a linear variable filter with an etalon structure including at least one tapered spacer region and a detector array having at least *n* detectors by

providing at least 3*n* calibration signals at 3*n* calibration wavelengths to the optical spectrometer component;

measuring an output from each of the *n* detectors in response to each of the calibration signals with an analyzer;

storing the output from each of the *n* detectors at each of the calibration signals to create a calibration array;

providing an optical input signal to the optical spectrometer component;

measuring a second output from each of the *n* detectors; and

reconstructing the optical input signal using the calibration array in an inverse transfer process to produce a reconstructed input signal.

18. The method of claim 17 wherein the optical spectrometer component has a nominal resolution of *X* nm and the reconstructed input signal has an equivalent resolution of better than *X*/5 nm.

19. The method of claim 17 wherein the optical spectrometer component has a nominal resolution of less than or equal to 8 Angstroms, and the calibration wavelengths are at intervals of about 0.5 Angstroms or less.

20. The method of claim 19 wherein the reconstructed output signal has an effective resolution of less than about 1.6 Angstroms.

21. The method of claim 17 wherein the optical spectrometer component comprises a detector array having at least 512 pixels and has a nominal resolution of less than or equal to 3 Angstroms over an operating band of between about 1530-1600 nm.

22. A method of measuring an optical signal with an optical spectrometer, the method comprising:

calibrating an optical spectrometer component having a linear variable filter with an etalon structure including at least one tapered spacer region and a detector array having at least *n* detectors to provide a nominal resolution of less than or equal to 8 Angstroms across an operating band of the optical spectrometer component, the operating band lying within about 1530-1600 nm, by

providing a plurality of calibration signals to the optical spectrometer component throughout the operating band at intervals of about 0.5 Angstroms;

measuring an output from each of the *n* detectors in response to each of the calibration signals with an analyzer;

storing the output from each of the *n* detectors at each of the calibration signals to create a calibration array;

providing an optical input signal to the optical spectrometer component;

measuring a second output from each of the *n* detectors; and

reconstructing the optical input signal using the calibration array in an inverse transfer process to produce a reconstructed input signal having an effective resolution of less than 1.6 Angstroms.

23. A method of monitoring an optical network, the method comprising:

calibrating an optical spectrometer having an optical detector with n detectors and a nominal resolution of X nm at at least $3n$ calibration wavelengths;

providing a plurality of optical signals on an optical transmission line;

coupling at least a portion of at least some of the plurality of optical signals to the optical spectrometer;

measuring the at least some of the plurality of optical signals with the optical spectrometer;

reconstructing the at least some of the plurality of optical signals using a transfer function to provide reconstructed signals having an effective resolution of at least $X/5$ nm.

24. The method of claim 23 wherein the monitoring of the optical network is a continuous monitoring of the optical network.

25. The method of claim 23 wherein the plurality of optical signals carried on the optical network are wavelength-division-multiplexed optical signals having a nominal channel spacing of less than or equal to about 200 GHz.

26. A optical transmission network comprising:

an input optical fiber configured to carry a plurality of wavelength-division-multiplexed optical signals having nominal channel spacing of about 200 GHz or less;

an output optical fiber;

an optical tap disposed between the input optical fiber and the output optical fiber and configured to couple a portion of at least some of the plurality of wavelength-division-multiplexed optical signals to

an optical spectrometer component having

a linear variable filter including an etalon structure with at least one tapered spacer region being tapered along a taper direction, and

a detector array affixed to the linear variable filter; and

an analyzer coupled to the optical spectrometer component so as to monitor each of the some of the plurality of optical signals.

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